

ENHANCING A PEN-BASED GROUPWARE SYSTEM THROUGH IMAGE CACHING AND GESTURE RECOGNITION

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DePauw University uses a pen-based groupware system to facilitate note taking in a classroom environment. The patent-pending commercial product, DyKnow VISION, extends earlier work carried out on campus. Our research relates to developing and testing techniques to alleviate two deficiencies users encountered with the system: slow navigation and the use of menus within a pen-based system.

DyKnow VISION provides users with an electronic notebook comprised of sequential pages on which notes can be taken. Because only one page is active at a time, navigation between pages is necessary. Navigation in the original version of DyKnow VISION included four navigation buttons (first, next, previous, and last) and a menu option which allowed the user to “jump” to a specified page. Because the user had to wait for each page to load while moving through the notebook and had no way, short of memorization, of knowing what page the information they were looking for was on, navigation proved slow and clumsy.

To alleviate the navigation problems, we designed and implemented an image caching scheme which allows the user to move through the notebook by scrolling and viewing pre-computed previews of pages rather than waiting for each page to load. A special thread is used to keep the cached images current. Movement through the cached images is accomplished through a standard Windows scrollbar, meaning the user has the option of clicking the bar itself or dragging the scroll box until the desired page is reached. The combination of the scrollbar and cached images allow the user to navigate more quickly than the original system.

Since DyKnow VISION is a pen-based system, users may operate it from an electronic whiteboard or Tablet PC. In both cases, the user might not have access to a keyboard or mouse. Using the menu or toolbar may feel unnatural in these cases because these interface elements were designed to be operated via a keyboard and mouse. When using a pen, however, it is more natural for a user to gesture on the screen, using gestures to replace keyboard shortcuts for power users. Therefore, we developed a gedric system for DyKnow VISION. Gedrics are gesture driven icons, allowing different actions to be associated with a gesture, depending on the icon the gesture is drawn on. The icons provide users with a visual cue as to what the gestures do. We also developed a gesture menu system, GedU, that allows users to learn how to draw the gestures while still being able to use the gedric system.

After making these enhancements to DyKnow VISION, we conducted a user study with twenty-two subjects. We will explain the methods of our user study in further detail in our talk. Through this study, we discovered that the scrollbar with preview box was rated highly by users. However, the gedric system was rated unfavorably for general use, with only one individual rating gedrics higher than the standard menus and toolbars. On the other hand, for certain tasks, namely for repetitive tasks, most users preferred to use gedrics. In the future, we plan to conduct a longer study in actual classes taught at DePauw and compare these results to our original study. We also hope to look into the application of our work to other systems besides DyKnow VISION.

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